

REMARKS

Applicants certainly appreciate the courteous assistance provided by Examiners Addisu and Howell in the interview held March 13th. Applicants are amending the claims in response to the office action mailed January 22, 2007. Applicants respectfully traverse the rejection of the claims over the cited art and respectfully request reconsideration.

Weigel, U.S. 4,594,030 discloses a drill that has a hydraulic feed chamber 36 (Fig. 4) that acts against the rearward side of piston 44 to push the inner housing and pneumatic motor 74 forward. Feed chamber 36 is supplied with hydraulic fluid from the hydraulic pump assembly 271. Since the feed is made hydraulically, there is no need for a hydraulic restrictor chamber to regulate the rate of forward movement, unlike devices that have pneumatic feed chambers. All of the claims require a feed passage for supplying air pressure to the feed chamber and a fluid restrictor chamber having hydraulic fluid therein for restricting the movement of the feed piston. Wiegel would have no motivation to utilize a restrictor chamber because the forward movement can be accurately controlled by the hydraulic fluid pressure.

Eckman, U.S. 5,149,232, controls the rate of feed movement by a gear train assembly shown in Figure 1. The forward advancement is mechanically driven, thus there is no need for a restrictor chamber to restrict movement of a pneumatic piston. Combining Eckman with Wiegel would teach one skilled in the art to change the hydraulic pressure for the feed chamber to a mechanical gear train arrangement.

As mentioned, it is known in the art to have restricting devices control the rate of movement of a feed piston that is pushed by air pressure. For example, the assignee of this application is the owner of U.S. 6,761,513, which discloses air cylinders 19 for advancing the

drill. Flow restriction cylinders 43 have hydraulic fluid therein and are regulated to set the rate of advancement due to the pneumatic pressure in the feed cylinders.

Applicants' claim 1 requires that the feed chamber be annular and located between inner and outer diameter portions of the inner housing and the outer housing. The claim also requires that the restrictor chamber be annular and located in an annular space between the inner housing and the outer housing. Those features are not shown in the prior art known to applicants.

Claim 3 points out that feed piston 33 serves both to advance inner housing 21 as well as push hydraulic fluid from restrictor chamber 41 into restrictor chamber 39. Claim 3 requires that the feed piston define a rearward portion of the restrictor chamber.

Claim 5 requires an annular retract piston located within an annular retract chamber surrounding the inner housing to cause retraction of the inner housing. In Wiegel, retract chamber 38 receives hydraulic fluid to act against the forward side of feed piston 44 for retracting the drill motor. In Wiegel, feed piston 44 thus receives hydraulic fluid pressure on one side to extend and the other side to retract. Applicants employ a separate retract piston and do not use the feed piston both feeding and retraction.

Claim 7 requires a sensor assembly that provides a signal when the inner housing begins to move from the retracted position and also provides a signal when the inner housing reaches the extended position. It further requires a processor that determines the elapsed time and compares the elapsed time to a predetermined reference to provide an indication when the elapsed time exceeds the reference. This feature thus enables an operator to learn when the drill bit is becoming dull.

Eckman, U.S. 5,149,232 discloses a peck drill, which is a drill of the type that drills forward a short distance, then automatically retracts to free the drill of cuttings, then returns. The cycle is repeated numerous times while drilling a single hole. Eckman has a timer arrangement shown in Figure 4 that controls the amount of time for each peck cycle. Eckman has a separate sensor that detects when the drill reaches the completion of the hole. See column 7, lines 50-63 and column 9, lines 47-57; column 10, lines 63-66; and column 11, lines 43-52. The timer is not used to determine an overall time to drill a hole. Rather the timer is preset to cause the cycling movement to occur numerous times when drilling a single hole. The timer is not used with a processor to determine when the drill becomes dull.

Claim 8 requires a dome member sealingly mounted in a cavity and a pneumatic passage extending to the cavity to cause the dome member to deflect into engagement with an electrical contact. The electrical contact of Frederick, shown in Figure 6, is simply a pressure switch that relies on the weight of an object 144 to cause it to come into contact with circuit board 158. Applicants submit there is no suggestion that switch 160 would operate with pneumatic air pulses. Claim 9 is similar to claim 8 and more detailed.

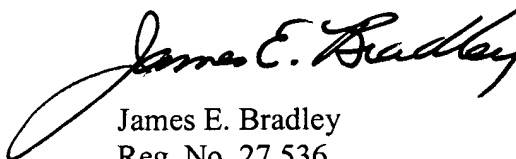
Claim 11 also requires an annular feed piston that is advanced by air pressure. It requires annular forward and rearward restrictor chambers located between the inner and outer housings and containing hydraulic fluid. These features are not shown in the references. Claim 12 specifies that the rearward restrictor chamber is defined by the feed piston, which separates the hydraulic fluid from the pneumatic pressure on the opposite side.

Claim 15 requires an annular feed piston and an annular retract piston, each extending around the inner housing. Locating feed and retract chambers in an annular space between the inner and outer housings is not suggested in the references. Claim 20 requires that the annular

feed piston define the rearward restrictor chamber. It requires that the pneumatic chamber be located on the rearward side of the feed piston. Claim 21 requires the dome member, feed cavity and pneumatic pressure passage for deflecting the dome member into engagement with the electrical contact.

It is respectfully submitted that the claims are now in condition for allowance and favorable action is respectfully requested.

Respectfully submitted,

A handwritten signature in black ink, reading "James E. Bradley". The signature is fluid and cursive, with a large, sweeping initial "J".

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